IV. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The first two phases of this study included the evaluation of existing conditions around the Waterside Mall and the assessment of the impacts of its redevelopment. The Study Team conducted a full evaluation of existing conditions around Waterside Mall and determined the locations where transportation issues need to be addressed. A map with the identified existing transportation issues was developed and is presented in Figure 14. Figure 35 summarizes the recommended improvements to address these issues.

The Study Team conducted a full evaluation of total background traffic scenarios for the years 2010 and 2022. These scenarios include existing traffic, growth in background traffic, traffic from other area developments using roads in the study area, and the assumed full occupancy of the currently vacant Waterside Mall office space. The assessment of this scenario indicates that for 2010 and 2022 several intersections are expected to operate at LOS F during the peak hours. Therefore, transportation improvements (mitigation measures) would be needed to address the expected deficiencies in the study area.

The Study Team also conducted a full evaluation of the PUD level of redevelopment of Waterside Mall under three scenarios for the years 2010 and 2022. The first scenario assumes that a connection of 4th Street between I and M Streets is not open to vehicles and serves strictly as a pedestrian promenade between these two roadways. The second scenario assumes that 4th Street is connected between I and M Streets and this connection is made available to vehicles. The final scenario uses service roadways proposed by the developer as an alternative to a vehicular connection of 4th Street between I and M Streets. As discussed in the Future Conditions with Site Development and Service Road Connection section of this report, while these service roadways alone do not represent a solution to traffic congestion in the study area, they will provide additional capacity if used in conjunction with the proposed 4th Street vehicular connection.

At the request of citizens, the Study Team conducted evaluations of three more options. One option assumed that an extension of 4th Street would be constructed to 6th Street via K Street. Another option assumed that the proposed service roads at the site would be operated as a one-way pair. The last option evaluated assumed that 3rd Street and 6th Street would be operated as a one-way pair. The Study team found that these three options would have significant detrimental effects on traffic operations in the study area and therefore are not recommended for implementation.

SELECT TO VIEW:

36. Recommended Improvements to Address Existing Transportation Issues

COMPARISON BETWEEN THE SCENARIO WITH A 4TH STREET VEHICULAR CONNECTION AND THE SCENARIO WITHOUT A VEHICULAR CONNECTION

The scenarios with and without a 4th Street vehicular connection have different effects on traffic operations in the study area and on pedestrian conditions. The scenario with a vehicular connection on 4th Street between M and I Streets would help reduce traffic on 3rd Street and would minimize the impacts of new development on this residential street.

SITE IMPACTS

Site impacts indicate what proportion of the forecast total traffic at a particular intersection is generated by new site traffic. The Study Team calculated the site impacts by dividing the additional site generated traffic by the total forecast traffic at each intersection.

Site impacts of less than five percent are low and generally reflect negligible effects on traffic operations and delays. Site impacts between five and 15 percent are moderate and minor effects on traffic operations and delays are expected at intersections with site impacts at these levels. Site impacts of more than 15 percent are significant and generally result in significant degradation of traffic operations and increased delays. The intersections most affected by the site traffic are those located in the immediate vicinity of the site. Site impacts generally decrease with increase distance to the site that generates the trips.

Figures 37 and 38 show that site traffic has the greatest impact on the intersection of 6th and I Streets in both scenarios. However, if the scenario with the 4th Street vehicular connection is implemented, site impacts at this intersection are expected to be reduced by approximately four percent during the AM and PM peak hours. Another intersection expected to see reduced impact is 7th and I Streets. The reduced impacts at these intersections show that the addition of a vehicular connection between M and I Streets would encourage fewer drivers entering the study area from the west to use I Street to access the site.

As expected, the site impacts at the intersections of 4th Street with I and M Streets increase with the 4th Street vehicular connection. These increased impacts are due to the creation of an additional approach at each intersection and the large amount of site traffic expected to use 4th Street between I and M Streets. When comparing the two scenarios, it can be seen that the expected impacts at the intersection of 3rd and I Streets increase with the 4th Street connection. However, the increase in site impact is associated with a *reduction* in overall volume at this intersection. Both site traffic and background traffic are expected to utilize the 4th Street extension. Due to the large volume of background traffic expected to be diverted away from this intersection, this intersection's percentage of site traffic is expected to be higher with the 4th Street vehicular connection than without it, but overall intersection volume will be less.

SELECT TO VIEW:

37. Site Impacts for 2010 Total Traffic with and without 4th Street Connection

SELECT TO VIEW:

38. Site Impacts for 2022 Total Traffic with and without 4th Street Connection

LEVEL OF SERVICE

It can be seen in Figure 39, Figure 40, Table 12 and Table 14 that the proposed 4th Street vehicular connection is expected to improve LOS and reduce delays at the two studied intersections on 3rd Street. This is primarily due to the effect of background and other area development trips that would divert away from this local, residential street to 4th Street. Without the 4th Street vehicular connection, the total daily traffic on 3rd Street is expected to increase from the existing 4,800 vehicles per day to 6,800 vehicles per day. With the 4th Street vehicular connection, the daily traffic volume on 3rd Street is expected to be 2,800 vehicles per day, which represents a significant reduction compared to existing conditions.

With a vehicular connection between I and M Street, total daily traffic on 4th Street north of I Street is expected to increase from the existing 7,500 vehicles per day to 17,000 vehicles under 2022 conditions. Under 2022 total background conditions, the daily volume on this segment is expected to be 16,200, indicating that 800 new daily trips are the impact at this location of the PUD level of redevelopment of Waterside Mall. The proposed 4th Street vehicular connection between M and I Streets is expected to have a daily traffic volume of 12,000 in 2022, indicating that this roadway will operate at or near capacity, discouraging further diversions from existing parallel traffic routes. A portion of this volume represents through trips on 4th Street that no longer need to use 3rd or 6th Streets to reach 4th Street south of M Street.

The Waterside Mall PUD and other area developments, either with or without the 4th Street vehicular connection, would create congestion throughout the study area without the implementation of traffic mitigation measures. Thus, the study team conducted the analysis of both of these scenarios assuming that parking would be prohibited on the south side of I Street during peak hours to accommodate the traffic needs. This additional lane would be needed to accommodate the additional traffic generated by other area developments and background growth even if there is no redevelopment at the Waterside Mall site. As expected, the intersection of 4th and I Streets will perform worse under the scenario with the 4th Street vehicular connection than under the scenario without the vehicular connection. However, the impact is minimal during the AM peak hour, and PM impacts are expected to occur on the proposed northbound leg. Transportation mitigation measures would be needed to further reduce congestion.

For the intersections on M Street/Maine Avenue, the intersections with 6th and 7th Streets will operate with approximately the same delay per vehicle under each of the proposed scenarios. The intersection of 4th and M Street will degrade, as expected, with the addition of the 4th Street connection. However, this degradation is expected to take place on the proposed southbound leg of 4th Street. The remaining legs of this intersection are expected to operate approximately equally under all scenarios. Finally, with the 4th Street vehicular connection, the intersection of 3rd and M Streets is expected to improve significantly, due to trips diverted to 4th Street.

SELECT TO VIEW:

39. 2010 Levels of Service

SELECT TO VIEW:

40. 2022 Levels of Service

QUEUING

A vehicular connection on 4th Street is expected to reduce queuing on 3rd Street, as shown in Figures 41 and 42. The reduction is primarily due to the background and other area development trips that will be diverted away from 3rd Street onto 4th Street. Southbound queues on 4th Street at I Street, and northbound queues on 4th Street at M Street are expected to be greater with the 4th Street vehicular connection. The increase in queue length is directly associated with the additional approach that was added to each intersection. The additional approach, additional volume and changes to signal timing necessary to accommodate the increased volumes result in longer queues. However, by 2022, the queues are approximately equal with or without the vehicular connection. Queues at other locations are expected to be similar with or without the vehicular connection.

PEDESTRIANS

With regards to pedestrians, the scenario without the proposed vehicular connection of 4th Street is the safer alternative. Without vehicles on the proposed 4th Street connection, pedestrians and vehicles would not be sharing the same right-of-way. However, the conflicts associated with a vehicular connection of 4th Street can be minimized with the implementation of mitigation measures throughout the connection. These measures should be implemented if a vehicular connection is constructed between I and M Streets.

RECOMMENDATIONS FOR FUTURE CONDITIONS

Based on higher levels of service, decreased delay and shorter queue lengths on 3rd Street, as well as reduced site impacts on I Street, the Study Team recommends the construction of the vehicular connection of 4th Street SW between I and M Streets. The primary effect of constructing this roadway will be decreased traffic on neighborhood residential streets, including 3rd and I Streets. Additionally, service roads proposed by the developer should be available to vehicles as a supplement to the recommended 4th Street vehicular connection.

4TH STREET

The recommended connection of 4th Street between I and M Streets should be open to vehicles. The roadway should have a five-lane cross-section. Parking should be permitted at all times on the curb lanes. There should be one travel lane in each direction, and the center lane should be used for left turn bays into the two proposed site driveways on 4th Street.

The increase in vehicular traffic associated with the redevelopment of Waterside Mall should not come at the expense of pedestrians. Measures should be implemented to ensure that vehicles travel at low speeds on the 4th Street connector. Additionally, the existing 21-second pedestrian phase at the intersection of 4th and I Streets should remain.

SELECT TO VIEW:

41. PM Maximum Queues for 2010 with and without 4th Street Vehicular Connection

SELECT TO VIEW:

42. PM Maximum Queues for 2022 with and without 4th Street Vehicular Connection

The analysis indicates that this can be obtained through the use of a 100-second cycle length at the intersections on I Street.

Due to both the Metro station and the expected increase in pedestrian activity along the proposed connection, motorists should be discouraged from using 4th Street as a through route. Recommendations to aid in accomplishing this are as follows:

- Rather than standard asphalt pavement, the new 4th Street connection should be constructed of a texturized pavement surface.
- Raised crosswalks should be constructed across 4th Street at M Street, at the driveway located north of the Metro station and at I Street.
- Parking should be permitted at all times in the curb lanes of 4th Street.
- A taxi stand zone should be designated on the west side of 4th Street adjacent to the intersection with M Street (next to the Metro Station entrance).

Figure 43 shows the recommended layout for the 4th Street vehicular connection, including pavement markings and crosswalks.

I STREET

In order to accommodate the traffic associated with the increase in background traffic, other area developments and the redevelopment of Waterside Mall, parking should be prohibited in the eastbound curb lane of I Street between 6th and 3rd Streets, during AM (7:00 – 9:30 AM) and PM (4:00 – 6:30) peak periods. Field observations indicate that this parking is little used during these periods. The curb lane should operate as an exclusive right turn lane at 3rd Street, allowing only the center lane to continue east towards South Capitol Street.

M STREET/ACCESS DRIVEWAYS

The developer of Waterside Mall is proposing two full-movement driveways on M Street, with median breaks to support them. One driveway is proposed to be located east of 4th Street and the other one is proposed to be located west of 4th Street. The analysis indicates that eastbound volumes on M Street during the PM peak hour are too high to allow for drivers to exit the driveway west of 4th Street onto eastbound M Street. This driveway, west of 4th Street, should be constructed as a right-in, right-out driveway only.

Figure 44 illustrates the driveway configuration proposed by the developer, as well as that proposed by the Study Team. Plans submitted by the developer indicate that the proposed M Street driveways serve as two separate entry/exit points to the site, creating a dangerous condition where conflicting movements are likely to occur. The site plan should be redesigned with the elimination of one of the access points at each driveway. The driveways proposed by the Study Team have one lane in and one lane out instead of the two lanes in and two lanes out that the developer is proposing. The analysis indicates that this proposed full-movement driveway between 3rd and 4th Streets would operate satisfactorily with only one lane out and one lane into the development.

SELECT TO VIEW:

43. Recommended Layout for 4th Street Vehicular Connection

SELECT TO VIEW:

44. M Street Driveways

ADDITIONAL LONG-TERM MITIGATION MEASURES

The Study Team compiled a list of additional recommended long-term mitigation measures, shown in Figure 45, intended to lessen the impact of the redeveloped Waterside Mall. These measures were implemented in SYNCHRO and modeled in SimTraffic. Table 16 and Figure 46 show that a substantial reduction in delay and improved levels of service can be achieved in the year 2022 with the implementation of these measures, while Figure 47 shows that reduced queues can be expected. Without these additional measures, seven of the eight studied intersections can be expected to operate at LOS F during the 2022 peak hour. However, with the implementation of these measures, only three of the eight will operate at LOS F, and two of the three will see substantial reductions in delay with the mitigation measures. During the 2022 AM peak hour, no intersections are expected to operate at LOS F.

- **3rd and I Streets**
    1. Signal Optimization

- **4th and I Streets**
    1. Signal Optimization

- **6th and I Streets**
    1. Signal Optimization

- **7th and I Streets**
    1. Signal Optimization
    2. Eliminate parking on southbound 7th Street between H Street (school driveway) and I Street during PM peak period (4:00 – 6:30 PM).
    3. Install signage concerning new parking restrictions.

- **7th Street and Maine Avenue**
    1. Convert southbound 7th Street operation to the following lane configuration: left, through/left, right
    2. Construct an additional eastbound left turn lane on Maine Avenue. Maintain three through lanes.
    3. Convert 7th Street signal timing/phasing to split phase.
    4. Signal optimization.

- **6th Street and Maine Avenue/M Street**
    1. Construct 80-foot eastbound left turn lane in existing median.
    2. Signal optimization. Do not create protected left turn phase for Maine Avenue/M Street traffic.
    3. Signal Optimization

SELECT TO VIEW:

45. Additional Long-Term Mitigation Measures

SELECT TO VIEW:

Table 16. Level of Service and Delay per Vehicle Comparison with 4th Street Vehicular Connection – Existing Conditions, 2022 Total Traffic, and 2022 Total Traffic with Additional Long-Term Mitigation Measures

SELECT TO VIEW:

46. 2022 Levels of Service (LOS) with Additional Mitigation Measures

SELECT TO VIEW:

47. PM Maximum Queues for 2022 with Additional Mitigation Measures

- **4th and M Streets**
    1. Construct 300-foot eastbound right turn lane, creating three eastbound through lanes.
    2. On the eastbound M Street approach to 4th Street, allow non-peak parking up to 60 feet before the intersection.
    3. On the eastbound receiving side of M Street, prohibit parking for the first 200 feet at all times.
    4. Prohibit peak period parking between 4th and 3rd Streets.
    5. Install signage concerning new parking restrictions.
    6. Signal optimization

3rd and M Streets

1. Prohibit peak period parking on eastbound M Street between 4th and 3rd Streets.
2. Signal optimization

A preliminary planning cost estimate of all recommended improvements is presented in Appendix K.